



UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

SERIAL NUMBER	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
---------------	-------------	----------------------	---------------------

07/655,514 03/06/90 TOMITA

S

EXAMINER

ROYER, W

ART UNIT

PAPER NUMBER

215

6

DATE MAILED: 09/16/91

This is a communication from the examiner in charge of your application.
COMMISSIONER OF PATENTS AND TRADEMARKS

☒ This application has been examined ☒ Responsive to communication filed on 8-17-90 ☐ This action is made final.

A shortened statutory period for response to this action is set to expire 3 month(s), — days from the date of this letter.
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

- ☒ Notice of References Cited by Examiner, PTO-892.
- ☒ Notice re Patent Drawing, PTO-948.
- ☒ Notice of Art Cited by Applicant, PTO-1449.
- ☐ Notice of Informal Patent Application, Form PTO-152.
- ☐ Information on How to Effect Drawing Changes, PTO-1474.
- ☒ Part of Rejection: Drawing

Part II SUMMARY OF ACTION

- ☒ Claims 1-7 are pending in the application.

Of the above, claims _____ are withdrawn from consideration.

- ☐ Claims _____ have been cancelled.

- ☐ Claims _____ are allowed.

- ☒ Claims 1-7 are rejected.

- ☐ Claims _____ are objected to.

- ☐ Claims _____ are subject to restriction or election requirement.

- ☐ This application has been filed with informal drawings under 37 C.F.R. 1.85 which are acceptable for examination purposes.

- ☐ Formal drawings are required in response to this Office action.

- ☐ The corrected or substitute drawings have been received on _____. Under 37 C.F.R. 1.84 these drawings are ☐ acceptable. ☐ not acceptable (see explanation or Notice re Patent Drawing, PTO-948).

- ☐ The proposed additional or substitute sheet(s) of drawings, filed on _____, has (have) been ☐ approved by the examiner. ☐ disapproved by the examiner (see explanation).

- ☐ The proposed drawing correction, filed on _____, has been ☐ approved. ☐ disapproved (see explanation).

- ☒ Acknowledgment is made of the claim for priority under U.S.C. 119. The certified copy has ☒ been received ☐ not been received
☐ been filed in parent application, serial no. _____; filed on _____.

- ☐ Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following is a quotation of 35 U.S.C. § 103 which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Subject matter developed by another person, which qualifies as prior art only under subsection (f) or (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

Claims 1-3 are rejected under 35 U.S.C. § 103 as being unpatentable over Tamura. A magnetic developing device is shown in figure 6. In the figure, a non-magnetic cylinder or developing sleeve 13 is shown. The cylinder rotates to carry a magnetic brush, formed from developer, on its surface in order to develop an electrostatic image on an electrostatic image bearing surface or photosensitive drum 14 when the developer on the sleeve is in a developing area where the magnetic brush contacts the electrostatic image bearing surface and an electric field is applied by a power source 18. It is noted that figure 5A is a plane view of a sleeve and figure 5B is a fragmentary cross sectional view of the sleeve taken along line V-V of figure 5A. The sleeve 6 has concavo-convexities provided on its surface so as to repeat the concavo-convexity successively with respect to the circumferential direction of the sleeve, namely, the

direction of rotation (arrow D) of the sleeve. It is noted that the above is also applicable to the sleeve shown in figure 6. In figure 9A to 9D cross sectional views showing the surface configurations used on the sleeves are shown. In figure 9A, both the valleys and peaks are sharp. In figure 9B both the valleys and peaks are rounded. In figure 9C only the valleys are rounded. In figure 9D only the peaks are rounded. It is further noted that Tamura states that the concavo-convexities should desirably be rounded rather than sharp. It does not teach that the developer consists of a toner and a carrier. However, the examiner takes official notice that it is old and well known in the art of photocopying to use a developer consisting of a developer and a toner in a magnetic developing device. Besides this, the examiner does not see the criticality of the type of developer being used because the invention deals with the grooves in the developing sleeve of the developing device with the sleeve being capable of supplying either type of developer. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made that a two component developer could be used in place of the single component developer in the developing device of Tamura because it is old and well known in the art to use a two component developer in a magnetic developing device with the exact type of developer that is used being a choice that is made when designing the apparatus.

Claims 4, 5 and 7 are rejected under 35 U.S.C. § 103 as being unpatentable over Matsumoto et al. A development apparatus is shown in figure 8. In the development apparatus, a magnetic roller 42 including a non-magnetic sleeve 44 with ridges and grooves formed in the axial direction of the magnetic sleeve on the peripheral surface of the non-magnetic sleeve, is employed. The developer comprises a toner and carrier particles in a developer container 41. The

developer is brought into contact with the latent electrostatic images formed on the surface of a photoconductor 1, developing the images. Referring to figure 9, a cross sectional view of each ridge in the direction normal to the axial direction of a non-magnetic sleeve 44a is rectangular and the height of the ridges, h , is in the range from 0.5 mm to 2.5 mm. The pitch of the ridges, p , which can be defined, for example, as the distance from the center of one ridge to the center of the adjacent ridge, is in the range from 1 mm to 20 mm, and the width, d , of each groove between the ridges is in the range from $1/10$ to $1/2$ the pitch of the ridges, p . It is also noted that Matsumoto et al teach that conventionally, in order to prevent the decrease of development performance, it is required that the ratio of the peripheral speed of the non-magnetic sleeve, v_r , to the peripheral speed of the photoconductor, v_p , be approximately 2.5 to 4.0, that is, $v_r/v_p \approx 2.5$ to 4.0. Consequently, the concept of the photoconductor rotating slower than the developing sleeve is taught as being old in the art. It is also believed that, with reference to the attached enlarged figure 9, that the relationship of $C \times S/D \geq A$ is also present in the Matsumoto et al patent. Besides this, it is noted that patentability may not stand only on an algorithm per se. It does not teach that an electric field is applied in the developing area. However, the examiner takes official notice that it is old and well known in the art of photocopying to apply an electric field to a developing sleeve and/or a photoconductor in a developing area. Besides this, the examiner fails to see the criticality of having the electric field applied because the invention deals with the grooves in the developing sleeve with the sleeve being capable of being used in a developing apparatus that either has or does not have an electric field applied in the developing area. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide the apparatus above with an electric field, if so desired when designing the developing apparatus, because it is old and well known in the art to provide an electric field in a developing area in order to assist in the transfer of toner from a developing

sleeve to an image on a photoconductor.

Claim 6 is rejected under 35 U.S.C. § 103 as being unpatentable over Matsumoto et al as applied to claims 4, 5 and 7 above, and further in view of Tamura. The prior art as applied above does not teach that each groove and the portion between adjacent grooves is curved gradually. Tamura teach that the peaks and valleys of the grooves on a developing sleeve should be rounded rather than sharp. It is also noted that Tamura teaches applying an electric field in a development area. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made that the idea of having rounded grooves on the sleeve could be applied to the Matsumoto et al sleeve because Tamura teaches that the peaks and valleys of the grooves on the sleeve should be rounded in order to allow a good developed image to be obtained.

The following prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Watanabe et al disclose in figure 5 a recommended working pattern of a plated surface of a sleeve.

Lounsbury, Jr. et al disclose a roller with spaced-apart grooves.

Ikegawa et al disclose a toner supply roller that is formed with a plurality of first minute recesses and is further formed, in the first minute recesses, with a plurality of second minute recesses finer than the first.

Serial No. 07/655,514

-6-


Art Unit 215

Honda et al disclose a developing apparatus having a developing roller with fine concavities.

Matsumoto et al (Japanese '565) is similar to the U.S. Patent used in the rejection above.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William J. Royer whose telephone number is (703) 308-3127.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-1782.

William J. Royer 
September 11, 1991

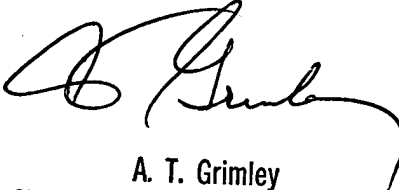

A. T. Grimley
SUPERVISORY PRIMARY EXAMINER
ART UNIT 215

FIG. 9

(1) Pitch of ridges, p , is defined as the distance from the center of one ridge to the center of the adjacent ridge, is in range from 1mm to 20mm.

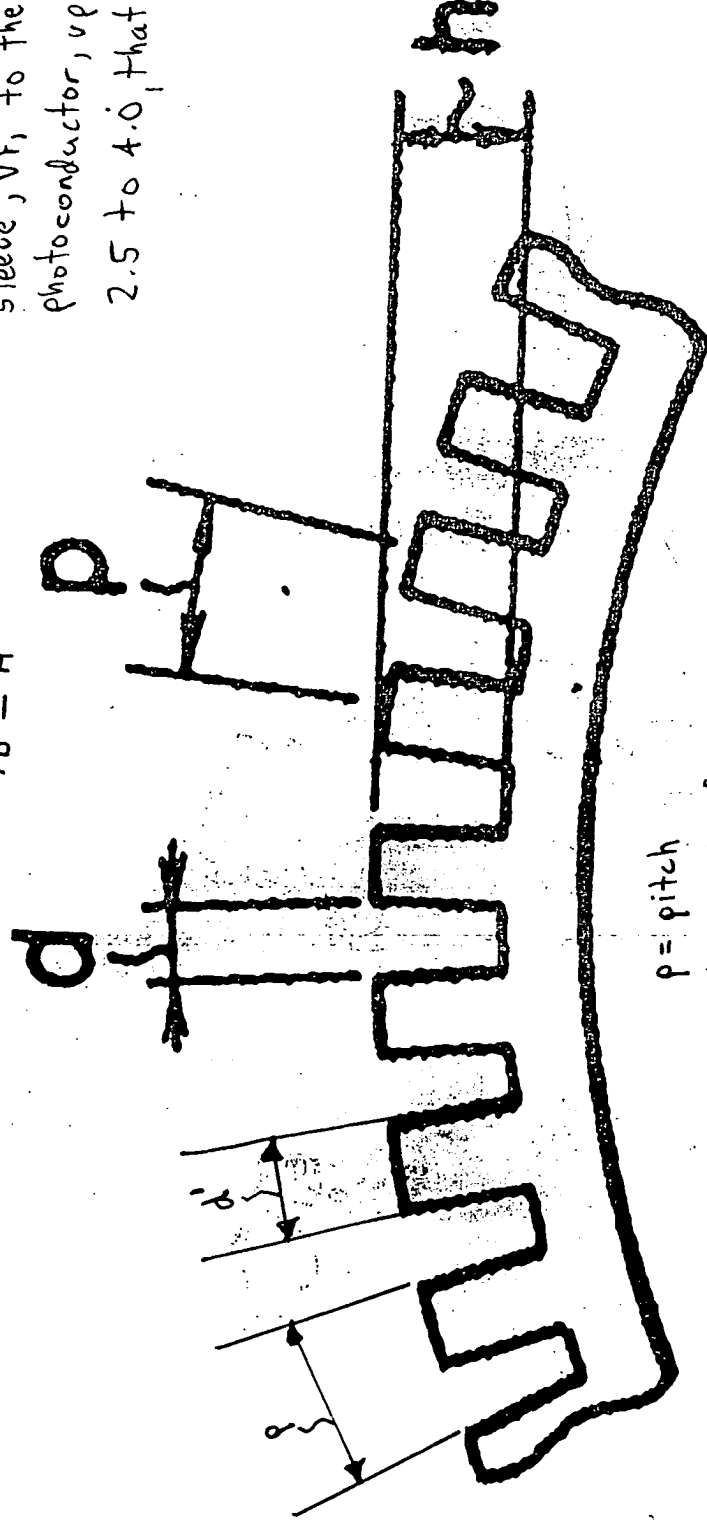
(2) The width, d , of each groove between the ridges is in the range not less than $1/10$ the pitch of the ridges, p , preferably in the range from $1/10$ to $1/2$ the pitch of the ridges, p .

(3) Conventionally, in order to prevent the decrease of development performance..., it is required that the ratio of the peripheral speed of the non-magnetic sleeve, v_r , to the peripheral speed of the photoconductor, v_p , be approximately 2.5 to 4.0, that is $v_r/v_p \approx 2.5$ to 4.0.

$$d' = p - d \text{ and } d = (1/10 \text{ to } 1/2)p$$

$$\therefore (p - 1/2p) \times v_r/v_p \geq p$$

which essentially satisfied $C \times S/D \geq A$



p = pitch

d = width of groove

d' = area between two grooves